

DHS Science and Technology Directorate

Foot-and-Mouth Disease Vaccine

Foot-and-mouth disease has a global impact

Foot-and-mouth disease (FMD) is a highly contagious disease that can severely affect domestic and wild cloven-hoofed animals, including cattle, swine, sheep, goats, deer and buffalo. Protecting American livestock is critical to the country's agricultural economy and preservation of food supplies.

FMD is a reportable disease, meaning that countries in which the disease is present cannot trade susceptible animals or their products with FMD-free countries. Therefore, FMD has a significant economic impact on affected countries, especially those that export agricultural products. Humans cannot contract FMD but they can act as mechanical carriers for the virus.



Example of inflamed gums of cow infected with foot-and-mouth disease. Such painful lesions prevent animals from eating.

FMD is considered a foreign animal disease in the United States (U.S.) because animals here have not been affected since 1929. However, FMD is globally recognized as being a “transboundary” disease with regional and global impact because of its relationship to international trade in animals and animal products and the movement of people worldwide.

FMD vaccine is the first to be produced in the U.S.

After six years, researchers at the Plum Island Animal Disease Center (PIADC) produced a vaccine for cattle against FMD. The first of its kind in the United States, the FMD vaccine can be manufactured on the U.S. mainland. The vaccine has been granted a conditional license by the Department of Agriculture (USDA) Center for Veterinary Biologics. With the licensing of this vaccine, there is now an

opportunity to add the vaccine to the North American FMD Vaccine Bank at PIADC. Until this breakthrough, FMD vaccines had to be manufactured outside the U.S.

This vaccine represents one of the largest developments in FMD vaccines in the last 50 years. The FMD vaccine was jointly developed by scientists from the USDA Agricultural Research Service and Department of Homeland Security Science and Technology Directorate (S&T) in collaboration with industry partners, GenVec Inc., a biopharmaceutical company based in Gaithersburg, Maryland and the Lincoln, Nebraska-based Antelope Valley Biologics, a Benchmark Biolabs affiliate. The vaccine provides the USDA with a “vaccinate to live” option during an outbreak of FMD.

The vaccine contains no live FMD virus

The vaccine is molecular-based, meaning it was engineered using a cell line capable of producing antigens (substances that provoke immune responses) without the use of the highly contagious FMD virus. Because the vaccine is produced without using live or killed FMD virus materials, it can be produced safely and cost effectively in the U.S. mainland and around the world. Field testing proved that the vaccine can be safely administered to cattle under normal U.S. cattle production conditions. For the first time, government authorities may use this vaccine during FMD emergencies. This is a major step forward for veterinary authorities with FMD management responsibilities.

A global benefit of the vaccine is that vaccinated animals can be easily distinguished from those exposed to the disease. In an outbreak situation, authorities can use simple serum tests to determine which cattle are free from infection, accelerating the eventual return to trade.

The vaccine also does not require expensive, high-containment facilities for manufacture because it does not use the infectious materials of the live FMD virus.

S&T PIADC is collaborating with a global veterinary biologics industry partner to transition the FMD vaccine to manufacturing.



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To learn more about the Plum Island Animal Disease Center and FMD Vaccine, contact SandT-Chembio@hq.dhs.gov.